

REMARKS

Applicant thanks the Examiner for consideration of the subject patent application. In the Office Action mailed July 27, 2006 (hereinafter, the "Office Action"), Claims 1, 4-15, and 20-21 were pending for consideration with Claims 2-3 and 22-30 being withdrawn from consideration, and Claims 16-19 cancelled. Of these, all pending claims were rejected as allegedly either anticipated or obvious under 35 U.S.C. §§ 102(e) and 103(a), respectively. Each of these rejections is addressed in turn below.

By the present amendment, Claim 1 has been amended to include subject matter from Claims 4 and 6. It should be noted that such amendment is made without conceding the correctness of the present rejection, and that Applicant expressly reserves the right to pursue any canceled or relinquished subject matter in a future continuing application. Furthermore, no new matter is added by this amendment. Additionally, Claims 4, 6, and 8-10 are canceled. Accordingly, Claims 1, 5, 7, 11-15 and 20-21 remain pending for consideration in the present application, and reconsideration thereof is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

Rejection under Ishikawa

Claims 1, 4, 7, 11, and 20-21 were rejected as allegedly anticipated by PCT Patent Publication No. WO 01/48816 to Ishikawa et al. (hereinafter "Ishikawa"). In the present amendment, subject matter from Claims 4 and 6 has been amended into independent Claim 1. Specifically, Claim 1 now includes the aspect of bonding the packed diamond particles by "infiltration of the interstitial material, wherein the infiltration is performed in a vacuum furnace at a

pressure below about 10^{-3} torr.” As Ishikawa does not teach the infiltration in a vacuum furnace at the claimed pressure, Applicant submits the rejection is moot in light of the present amendment. Therefore, withdrawal of the rejection is respectfully requested.

Rejection under the Hall Reference

Claims 1, 4, 7, and 11-15 were rejected as allegedly anticipated by United States Patent Publication No. 2002/0023733 to Hall (hereinafter “Hall”). By the present amendment, independent Claim 1 has been amended to include subject matter from Claims 4 and 6, which specifies “infiltration of the interstitial material, in a vacuum furnace at a pressure below about 10^{-3} torr.” The Examiner concedes that Hall does not teach an infiltration step preformed in a vacuum furnace at a pressure below about 10^{-3} torr. See Office Action, page 6, paragraph 21. As Hall does not teach each and every element of the presently claimed invention, Applicant believes this rejection to be moot in light of the claims as amended. Therefore, Applicant respectfully submits that the Hall reference does not teach the claimed invention and requests that rejections based thereon be withdrawn.

Rejections Under 35 U.S.C. § 103(a) based on Hall

Before discussing the obviousness rejections herein, it is thought proper to briefly state what is required to sustain such a rejection. The issue under § 103 is whether the PTO has stated a case of *prima facie* obviousness. According to the MPEP § 2142, the Examiner has the burden and must establish a case of *prima facie* obviousness by showing the prior art reference, or references combined, teach or suggest all the claim limitations in the instant application. Further, the Examiner has to establish some motivation or suggestion to combine and/or modify the

references, where the motivation must arise from the references themselves, or the knowledge generally available to one of ordinary skill in the art. The Applicant respectfully asserts the Examiner has not satisfied the requirement for establishing a case of *prima facie* obviousness in any of the rejections. Specifically, Hall does not teach bonding packed diamond particles by the interstitial material, nor does it teach such bonding by infiltration of interstitial material, and further, it does not teach infiltration at the presently claimed pressure.

Hall in view of Sung

Claims 5 and 6 were rejected as allegedly obvious over Hall in view of U.S. Patent No. 6,193,770 (hereinafter, "Sung"). As has been previously pointed out, the claimed invention requires "bonding the packed diamond particles by the interstitial material." In this way, the claimed composite heat spreader is bonded or held together primarily by the interstitial material and not by sintered diamond-diamond bonding.

On the other hand, Hall teaches a fully sintered diamond mass. The diamond masses are "intergrown into a unified matrix" and the "diamond crystals are intergrown at high temperature and high pressure their boundaries are intimately merged creating an uninterrupted thermal path through the material." See paragraphs 0009 and 0017. Merging the boundaries occurs as carbon is dissolved from adjacent diamonds that recrystallize as diamond such that the crystal grains merge at their boundaries. The intergrowth referred to in Hall is clearly sintering connections of the diamond. Hall specifically teaches this point as noted by the teaching that a catalyst melts "and a portion of it infiltrates the diamond mixture causing the diamond crystals to chemically bond to one another in a process known as intergrowth." See paragraph 0022.

The Examiner continues to allege that Hall suggests the use of copper in the presently claimed manner. Close examination of Hall would show that the reference teaches that copper may be used as a bondable material for forming a layer which is readily bonded to a heat sink or other surface, and that some residual copper may remain in the sintered matrix. See paragraphs 0015 and 0023. Hall does not teach using copper or any other material as an interstitial material which actually binds the diamond particles together. Rather, Hall is very clear that the bonding is a result of diamond sintering. The copper is taught to add convenience and a useful means of attaching to a desired electronic device through a bondable layer of the heat spreader.

Hall further supports the position of teaching a sintered diamond mass by stating that “[e]ven with the catalyst metal substantially removed, the diamond matrix remains intact because the diamond crystals are *bonded*, intergrown, together” (emphasis added). See paragraph 0027, last sentence. This statement makes it clear that Hall does not teach a plurality of diamond particles bonded or cemented by a distinctly separate material, i.e. an interstitial material.

As Hall fails to teach bonding packed diamond particles by an interstitial material, it inherently cannot teach bonding performed by infiltration of the interstitial material. Further even, it inherently cannot teach bonding by an interstitial material via infiltration in a vacuum furnace at a pressure below 10^{-3} torr. Sung does not remedy these missing claim elements, e.g., Sung does not teach or suggest “bonding the packed diamond particles by the interstitial material.” As such, a *prima facie* case necessary to support a § 103 rejection was not established, and removal of the rejection is respectfully requested.

Hall in view of Vereschagin

Claims 8-10 were rejected as allegedly obvious over Hall in view of U.S. Patent No. 1,382,080 (hereinafter, "Vereschagin"). By the present amendment, Claims 8-10 were canceled. In light of the cancellation, Applicant believes this rejection to be moot. Furthermore, the cited references fail to teach each and every element of the presently claimed invention. Hall fails to teach bonding packed diamond particles by an interstitial material, bonding performed by infiltration of the interstitial material, and bonding via infiltration in a vacuum furnace at a pressure below 10^{-3} torr. These missing claim limitations are not remedied by the combination with Vereschagin. Therefore, removal of the rejection is respectfully requested.

CONCLUSION

In view of the foregoing, Applicant believes that presently pending Claims 1, 5, 7, 11-15 and 20-21 present allowable subject matter and allowance is respectfully requested. If any impediment to the allowance of these claims remains after consideration of the above remarks, and such impediment could be resolved during a telephone interview, the Examiner is invited to telephone the undersigned attorney, or in his absence, Mr. David W. Osborne, at (801) 566-6633, to address such issues as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 26th day of October, 2006.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP



David W. Osborne
Reg. No. 44,989
8180 South 700 East, Suite 300
Sandy, UT 84070
Telephone: (801) 566-6633
Facsimile: (801) 566-0750


DWO/SAA:ja